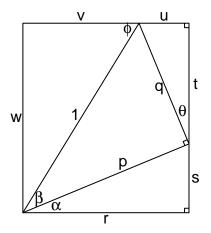## Question 1

In terms of α and β, express all the lengths and other angle measures (θ and ϕ).

Variable	Algebraic expression
$p \;=$	
$q \;=$	
$r \;=$	
$s \;=$	
$\theta \;=$	
$t \;=$	
$u \;=$	
$\phi \;=$	
$v \;=$	
$w \;=$	

Question 2

The angle-sum and angle-difference identities are listed below:

$$\sin(\alpha \pm \beta) = \sin(\alpha)\cos(\beta) \pm \cos(\alpha)\sin(\beta)$$
$$\cos(\alpha \pm \beta) = \cos(\alpha)\cos(\beta) \mp \sin(\alpha)\sin(\beta)$$

You know the following:

$$\sin(30°) = \frac{1}{2} \qquad\qquad \sin(225°) = \frac{-\sqrt{2}}{2}$$

$$\cos(30°) = \frac{\sqrt{3}}{2} \qquad\qquad \cos(225°) = \frac{-\sqrt{2}}{2}$$

Determine $\sin(255°)$ exactly.

Question 3

Prove the (sine) double-angle identity: $\sin(2x) = 2\sin(x)\cos(x)$

(Hint: start with an angle-sum formula from Question 2.)

Question 4

Prove the (cosine) double-angle identity: $\cos(2x) = 2\cos^2(x) - 1$

(Hint: start with an angle-sum formula from Question 2. Also, you will need to use the Pythagorean Identity: $\sin^2(x) + \cos^2(x) = 1$)

Question 5

Prove the (cosine) half-angle identity: $\cos\left(\frac{y}{2}\right) = \pm\sqrt{\frac{1+\cos(y)}{2}}$.

(Hint: start with the double-angle identity from Question 4.)

Question 6

Given $\cos(136°) \approx -0.72$, what is $\cos(68°)$? Please set up an expression, but do **not** try to simplify or evaluate a decimal approximation.

(Hint: $136/2 = 68$.)